

BS EN 61010-2-030:2010

Incorporating corrigendum May 2010



BSI Standards Publication

Safety requirements for electrical equipment for measurement, control, and laboratory use

Part 2-030: Particular requirements for
testing and measuring circuits

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

raising standards worldwide™

Full document details: BS EN 61010-2-030:2010



National foreword

This British Standard is the UK implementation of EN 61010-2-030:2010. It is identical to IEC 61010-2-030:2010, incorporating corrigendum May 2010.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by IEC corrigendum May 2010 is indicated in the text by AC1 AC1.

The UK participation in its preparation was entrusted to Technical Committee EPL/66, Safety of measuring, control and laboratory equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© BSI 2011

ISBN 978 0 580 75548 4

ICS 19.080; 71.040.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2010.

Amendments/corrigenda issued since publication

Date	Text affected
31 July 2011	Implementation of IEC corrigendum May 2010

**Safety requirements for electrical equipment for measurement, control,
and laboratory use -**

**Part 2-030: Particular requirements for testing and measuring circuits
(IEC 61010-2-030:2010)**

Règles de sécurité pour appareils
électriques de mesure, de régulation et
de laboratoire -
Partie 2-030: Exigences particulières pour
les circuits de test et de mesure
(CEI 61010-2-030:2010)

Sicherheitsbestimmungen für elektrische
Mess-, Steuer-, Regel- und Laborgeräte -
Teil 2-030: Besondere Bestimmungen für
Prüf- und Messkreise
(IEC 61010-2-030:2010)

This European Standard was approved by CENELEC on 2010-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 66/417/FDIS, future edition 1 of IEC 61010-2-030, prepared by IEC TC 66, Safety of measuring, control and laboratory equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61010-2-030 on 2010-10-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2011-07-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2013-10-01

This Part 2-030 is to be used in conjunction with the latest edition of EN 61010-1, Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements. It was established on the basis of the 2010 edition of EN 61010-1. Amendments and revisions of Part 1 have also to be taken into account and the dates when such changes become applicable will be stated in the relevant amendment or revision of Part 1.

This Part 2-030 supplements or modifies the corresponding clauses in EN 61010-1 so as to convert it into the European Standard: *Particular requirements for testing and measuring circuits*.

Where a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. Where this part states “addition”, “modification”, “replacement”, or “deletion” the relevant requirement, test specification or note in Part 1 should be adapted accordingly.

In the second edition of EN 61010-1, the requirements for testing and measuring circuits were included in Part 1 itself. In the third edition of EN 61010-1, these requirements have been removed from Part 1 and have become the basis for the requirements in this Part 2.

In addition to the requirements removed from Part 1, the following major requirements have been added to this standard. Numerous other changes have also been made.

- The terminology for MEASUREMENT CATEGORY I has changed. In this Part 2, it is termed “not rated for measurements within MEASUREMENT CATEGORIES II, III, or IV”.
- CLEARANCES and CREEPAGE DISTANCES have been added for unmated measuring circuit TERMINALS.
- Requirements have been added for specialized measuring circuit TERMINALS.
- Requirements for TRANSIENT OVERVOLTAGE limiting devices have been revised.
- Requirements have been revised and added pertaining to REASONABLY FORESEEABLE MISUSE of measuring circuits, including disconnection of the protective earth and usage of the equipment in a manner that might cause arc flash.
- Insulation requirements for measuring circuits have been primarily located in Annex K.
- Annex AA has been added to describe the characteristics of MEASUREMENT CATEGORIES.
- Annex BB has been added to describe hazards that may be encountered when using measuring circuits.

NOTE 1 The following print types are used:

- requirements: in roman type;

- *conformity and test: in italic type;*
- NOTES: in small roman type;
- terms used throughout this standard which have been defined in Clause 3: SMALL ROMAN CAPITALS;

NOTE 2 Subclauses, figures, tables and notes which are additional to those in Part 1 are numbered starting from 101. Additional Annexes are numbered AA and BB.

Annex ZA of Part 1 is applicable.

Endorsement notice

The text of the International Standard IEC 61010-2-030:2010 was approved by CENELEC as a European Standard without any modification.

Bibliography

Add the following reference to the Bibliography of Part 1:

EN 41003:1999

IEC 61010-2-032

NOTE Harmonized as EN 61010-2-032

CONTENTS

1	Scope and object	6
2	Normative references	6
3	Terms and definitions	6
4	Tests	7
5	Marking and documentation	7
6	Protection against electric shock	8
7	Protection against mechanical HAZARDS	11
8	Resistance to mechanical stresses	11
9	Protection against the spread of fire	11
10	Equipment temperature limits and resistance to heat	11
11	Protection against HAZARDS from fluids	11
12	Protection against radiation, including laser sources, and against sonic and ultrasonic pressure	11
13	Protection against liberated gases and substances, explosion and implosion	11
14	Components and subassemblies	11
15	Protection by interlocks	12
16	HAZARDS resulting from application	12
17	RISK assessment	12
101	Measuring circuits	12
Annexes		17
Annex K (normative) Insulation requirements not covered by 6.7		17
Annex L (informative) Index of defined terms		23
Annex AA (normative) Measurement categories		24
Annex BB (informative) Hazards pertaining to measurements performed in certain environments		27
Bibliography		30
Figure AA.1 – Example to identify the locations of measuring circuits		27
Table 101 – CLEARANCES and CREEPAGE DISTANCES for measuring circuit TERMINALS with HAZARDOUS LIVE conductive parts		10
Table 102 – Impulse withstand voltages		12
Table K.101 – CLEARANCES for MEASUREMENT CATEGORIES II, III and IV		18
Table K.102 – Test voltages for testing electric strength of solid insulation in measuring circuits of MEASUREMENT CATEGORY II		19
Table K.103 – Test voltages for solid insulation in measuring circuits of MEASUREMENT CATEGORY III		19
Table K.104 – Test voltages for testing electric strength of solid insulation in measuring circuits of MEASUREMENT CATEGORY IV		19
Table K.105 – Test voltages for testing long term stress of solid insulation in measuring circuits		20
Table K.106 – Maximum TRANSIENT OVERVOLTAGES		22

Table AA.1 – Characteristics of MEASUREMENT CATEGORIES	26
--	----

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –

Part 2-030: Particular requirements for testing and measuring circuits

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1.1 Equipment included in scope

Replace the text with the following:

This part of IEC 61010 specifies safety requirements for testing and measuring circuits which are connected for test or measurement purposes to devices or circuits outside the measurement equipment itself.

These include measurement circuits which are part of electrical test and measurement equipment, laboratory equipment, or process control equipment. The existence of these circuits in equipment requires additional protective means between the circuit and an OPERATOR.

NOTE 1 These testing and measuring circuits may, for example:

- measure voltages in circuits of other equipment,
- measure temperature of a separate device via a thermocouple,
- measure force on a separate device via a strain gauge,
- inject a voltage onto a circuit to analyze a new design.

NOTE 2 Testing and measuring circuits that are not within the scope of this Part 2 are considered to be covered by the requirements of Part 1.

NOTE 3 Equipment containing these testing and measuring circuits may be intended for performing tests and measurements on hazardous conductors, including MAINS conductors and telecommunication network conductors. See Annex BB for considerations of HAZARDS involved in various tests and measurements.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

3.5 Safety terms

Add a new definition:

3.5.101

MEASUREMENT CATEGORY

classification of testing and measuring circuits according to the type of MAINS CIRCUITS to which they are intended to be connected

NOTE MEASUREMENT CATEGORIES take into account OVERVOLTAGE CATEGORIES, short-circuit current levels, the location in the building installation at which the test or measurement is to be made, and some forms of energy limitation or transient protection included in the building installation. See Annex AA for more information.

4 Tests

This clause of Part 1 is applicable.

5 Marking and documentation

This clause of Part 1 is applicable, except as follows:

5.1.5 TERMINALS, connections and operating devices

Add a new subclause:

5.1.5.101 Measuring circuit TERMINALS

5.1.5.101.1 General

Except as permitted in 5.1.5.101.4:

- a) the RATED voltage to earth of measuring circuit TERMINALS shall be marked, and
- b) the RATED voltage or the RATED current, as applicable, of each pair or set of measuring circuit TERMINALS that are intended to be used together shall be marked, and
- c) the pertinent MEASUREMENT CATEGORY for each pair or set of measuring circuit TERMINALS or symbol 14 of Table 1 of Part 1 shall be marked as specified in 5.1.5.101.2 and 5.1.5.101.3, if applicable.

NOTE 1 Measuring circuit TERMINALS are usually supplied in pairs or sets. Each pair or set of TERMINALS may have a RATED voltage or a RATED current, or both, within that set, and each individual TERMINAL may have a RATED voltage to earth. Some instruments may have a measurement RATED voltage (between TERMINALS) different from the RATED voltage to earth. Markings should be clear to avoid misunderstanding.

Symbol 14 of Table 1 shall be marked if current measuring TERMINALS are not intended for connection to current transformers without internal protection (see 101.2).

Markings shall be placed adjacent to the TERMINALS. However, if there is insufficient space (as in multi-input equipment), the marking may be on the RATING plate or scale plate, or the TERMINAL may be marked with symbol 14 of Table 1.

NOTE 2 For any set of measuring circuit TERMINALS, symbol 14 of Table 1 does not need to be marked more than once, if it is close to the TERMINALS.

Conformity is checked by inspection and, if applicable, as specified in 5.1.5.101.2 and 5.1.5.101.3, taking into account the exceptions in 5.1.5.101.4.

5.1.5.101.2 Measuring circuit TERMINALS RATED for MEASUREMENT CATEGORIES II, III or IV

The relevant MEASUREMENT CATEGORY shall be marked for measuring circuit TERMINALS RATED for measurements within MEASUREMENT CATEGORIES II, III or IV. The MEASUREMENT CATEGORY markings shall be “CAT II”, “CAT III” or “CAT IV” as applicable.

NOTE Marking more than one type of MEASUREMENT CATEGORY and its RATED voltage to earth is permissible (see also 5.1.5.101.1, Note 1).

Conformity is checked by inspection.

5.1.5.101.3 Measuring circuit TERMINALS RATED for connection to voltages above the level of 6.3.1

Symbol 14 of Table 1 shall be marked for measuring circuit TERMINALS RATED for connection to voltages above the levels of 6.3.1, but that are not RATED for measurements within MEASUREMENT CATEGORIES II, III or IV (see also 5.4.1 bb)).

Conformity is checked by inspection.

5.1.5.101.4 Low voltage, permanently connected, or dedicated measuring circuit TERMINALS

Measuring circuit TERMINALS do not need to be marked if

- a) they are intended to be permanently connected and not ACCESSIBLE (see 5.4.3 aa) and bb)), or
- b) they are dedicated only for connection to specific TERMINALS of other equipment, or;
- c) it is obvious from other indications that the RATED voltage is below the levels of 6.3.1.

NOTE Examples of acceptable indications that the inputs are intended to be less than the levels of 6.3.1 include:

- the full scale deflection marking of a single-range indicating voltmeter or ammeter or maximum marking of a multi-range multimeter;
- the maximum range marking of a voltage selector switch;
- a marked voltage or power rating expressed in dB, mW or W, where the equivalent value, as explained in the documentation, is below 33 V a.c.

5.4.1 General

Add new items to the list:

- aa) information about each relevant MEASUREMENT CATEGORY if the measuring circuit has a RATING for MEASUREMENT CATEGORY II, III or IV (see 5.1.5.101.2);
- bb) for measuring circuits that do not have a RATING for MEASUREMENT CATEGORY II, III or IV, but could be misused by connection to such circuits, a warning not to use the equipment for measurements on MAINS CIRCUITS, and a detailed RATING including TRANSIENT OVERVOLTAGES (see AA.2.4 for more information).

NOTE Some equipment may have multiple MEASUREMENT CATEGORY RATINGS for the same measuring circuit. For such equipment, the documentation needs to clearly identify the MEASUREMENT CATEGORIES where the equipment is intended to be used and where it must not be used.

5.4.3 Equipment installation

Add new items to the list:

- aa) for permanently connected measuring circuit TERMINALS RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the MEASUREMENT CATEGORY, RATED maximum WORKING VOLTAGE, and RATED maximum current, as applicable (see 5.1.5.101);
- bb) for permanently connected measuring circuit TERMINALS that are not RATED for MEASUREMENT CATEGORIES II, III or IV, information regarding the RATED maximum WORKING VOLTAGE, RATED maximum current, and RATED maximum TRANSIENT OVERVOLTAGES as applicable (see 5.1.5.101).

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.1.2 Exceptions

Add a new item to the list:

- aa) locking or screw-held type measuring TERMINALS, including TERMINALS which do not require the use of a TOOL.

6.5.2.1 General

Replace the conformity statement with the following:

Conformity is checked as specified in 6.5.2.2 to 6.5.2.6 and 6.5.2.101.

6.5.2.3 PROTECTIVE CONDUCTOR TERMINAL

Replace h) 2) with the following h) 2):

- h) 2) the PROTECTIVE BONDING shall not be interrupted by any switching or interrupting device. Devices used for indirect bonding in test and measurement circuits (see 6.5.2.101) are permitted to be part of the PROTECTIVE BONDING.

Add a new subclause:

6.5.2.101 Indirect bonding for testing and measuring circuits

Indirect bonding establishes a connection between the PROTECTIVE CONDUCTOR TERMINAL and ACCESSIBLE conductive parts if these become HAZARDOUS LIVE as a result of a fault. Devices to establish indirect bonding are:

- a) voltage limiting devices which become conductive when the voltage across them exceeds the relevant levels of 6.3.2 a), with overcurrent protection to prevent breakdown of the device;

Conformity is checked by connecting the ACCESSIBLE conductive parts to the MAINS supply TERMINALS while the equipment is connected to the MAINS supply as in NORMAL USE. The voltage between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL shall not exceed the relevant levels of 6.3.2 a) for more than 0,2 s.

- b) voltage-sensitive tripping devices which interrupt all poles of the MAINS supply, and connect the ACCESSIBLE conductive parts to the PROTECTIVE CONDUCTOR TERMINAL whenever the voltage across them reaches the relevant levels of 6.3.2 a).

Conformity is checked by applying the relevant voltage level of 6.3.2 a) between the ACCESSIBLE conductive parts and the PROTECTIVE CONDUCTOR TERMINAL. The tripping action shall take place within 0,2 s.

6.6 Connections to external circuits

Add new subclauses:

6.6.101 Measuring circuit TERMINALS

Conductive parts of each unmated measuring circuit TERMINAL which could become HAZARDOUS LIVE when the maximum RATED voltage is applied to other measuring circuit TERMINALS on the equipment shall be separated by at least the CLEARANCE and CREEPAGE DISTANCE of Table 101 from the closest approach of the test finger touching the external parts of the TERMINAL in the least favourable position. See Figure 1 of Part 1.